CLAIMS

1. A composition for reducing the concentration of molecular oxygen present in an atmosphere or liquid, comprising at least one reducible organic compound which is reduced under predetermined conditions, the reduced form of the compound being oxidizable by molecular oxygen, wherein the reduction and/or subsequent oxidation of the organic compound occurs independent of the presence of a transition metal catalyst.

2. A composition according to claim 1, wherein the reduction and/or subsequent oxidation of the at least one reducible organic compound is also independent of the presence of an alkali or acid catalyst.

3. A composition according to claim 1 or 2, wherein the predetermined conditions are selected from the group consisting of irradiation with light of a certain intensity or wavelength, gamma-irradiation, corona discharge, exposure to an electron beam, or application of heat.

4. A composition according to claim 3, wherein the predetermined conditions is irradiation with visible or ultraviolet light.

5. A composition according to claim 3, wherein the predetermined conditions is gamma-irradiation.

6. A composition according to claim 3, wherein the predetermined conditions is exposure to an electron beam.

7. A composition according to any one of claims 4, 5 and 6, wherein the reducible organic compound is reduced by conversion to an excited triplet form.

8. A composition according to any one of claims 4-7 wherein the reducible organic compound is selected from the group consisting of quinones, photoreducible dyes and carbonyl compounds which have absorbence in the UV spectrum.

9. A composition according to claim 8, wherein the

reducible organic compound is selected from the group consisting of benzoquinone, 9,10-anthraquinone, substituted 9,10-anthraquinone, 1,4-napthoquinone, azo thiazine, indigoid and triarylmethane compounds.

10. A composition according to claim 9, wherein the reducible organic compound is selected from the group consisting of 2-ethyl-9,10-anthraquinone, 2-methyl-9,10-athraquinone and anthraquinone-2-aldehyde.

11. A composition according to any one of claims 1-7, wherein the reducible organic compound is present in a polymerised or oligomerised form.

12. A composition according to claim 11, wherein the polymerised organic compound comprises monomers or co-monomers which are covalently bonded to the reducible organic compound.

13. A composition according to claim 12, wherein the reducible organic compound is selected from the group consisting of quinones, photoreducible dyes and carbonyl compounds which have absorbence in the UV spectrum.

14. A composition according to claim 13, wherein the reducible organic compound is selected from the group consisting of benzoquinone, 9,10-anthraquinone, substituted 9,10-anthraquinone, 1,4-napthoquinone, azo thiazine, indigoid and triarylmethane compounds.

15. A composition according to claim 14, wherein the reducible organic compound is selected from the group consisting of 2-ethyl-9,10-anthraquinone, 2-methyl-9,10-athraquinone and anthraquinone-2-aldehyde.

16. A composition according to any one of the preceding claims, wherein the reducible organic compound comprises 0.1-99.9wt% of the composition.

17. A composition according to claim 16, wherein the reducible organic compound comprises 0.1 - 50 wt% of the composition.

18. A composition according to any one of the preceding

claims, further comprising a scavenging component reactive towards an activated oxygen species.

19. A composition according to claim 18 wherein the scavenging component is a compound selected from the group consisting of organic antioxidants, organic phosphites, organic phosphines, organic phosphates, hydroquinone and substituted hydroquinone; inorganic compounds including sulphates, sulphites, phosphites and nitrites of metals; sulphur-containing compounds including thiodipropionic acid and its esters and salts, thio-bis (ethylene glycol beta-aminocrotonate), cysteine, cystine and methionine; and nitrogen-containing compounds including primary, secondary and tertiary amines and their derivatives.

20. A composition according to claim 19, wherein the scavenging compound is selected from the group consisting of triphenylphosphine, triethylphosphite, triisopropylphosphite, triphenylphosphite, tris (nonylphenyl) phosphite, tris (mono- and bis-nonylphenyl) phosphite, butylated hydroxytoluene, butylated hydroxyanisole, tris (2, 4-di-tert-butylphenyl) phosphite, dilaurylthiodipropionate, 2,2'-methylene-bis-(6-t-butyl-p-cresol), tetrakis (2, 4-d-tert-butylphenyl) (4, 4'-biphenylene diphosphonite, poly (4-vinylpyridine) and mixtures thereof.

21. A composition according to claim 18, wherein the scavenging component is present in a polymerised or oligomerised form.

22. A composition according to claim 21 wherein the scavenging component comprises monomers or co-monomers which are covalently bonded to a compound reactive towards an activated oxygen species.

23. A composition according to claim 22 wherein the compound reactive towards an activated oxygen species is selected from the group consisting of organic antioxidants, organic phosphites, organic phosphines,

organic phosphates, hydroquinone and substituted hydroquinone; inorganic compounds including sulphates, sulphites, phosphites and nitrites of metals; sulphur-containing compounds including thiodipropionic acid and its esters and salts, thio-bis (ethylene glycol beta-aminocrotonate), cysteine, cystine and methionine; and nitrogen-containing compounds including primary, secondary and tertiary amines and their derivatives.

24. A composition according to claim 23 wherein the compound reactive towards an activated oxygen species is selected from the group consisting of triphenylphosphine, triethylphosphite, triisopropylphosphite, triphenylphosphite, tris (nonylphenyl) phosphite, tris (mono- and bis-nonylphenyl) phosphite, dilaurylthiodipropionate, 2,2'-methylene-bis-(6-t-butyl-p-cresol), butylated hydroxytoluene, butylated hydroxyanisole, tris (2, 4-di-tert-butylphenyl) phosphite, tetrakis (2, 4-d-tert-butylphenyl) (4, 4'-biphenylene diphosphonite, poly (4-vinylpyridine) and mixtures thereof.

25. A composition according to any one of the preceding claims, further comprising an adhesive agent or a polymer.

26. A composition according to claim 25, wherein the polymer is selected from the group consisting of polyvinyls, polyurethanes, polyolefins and polyesters or their copolymers, ethyl cellulose, cellulose acetate, silica gel or mixtures thereof.

27. A composition according to any one of claims 11-17, 21-26, wherein the reducible organic compound and the scavenging component are present in polymerised form(s).

28. A method for reducing the concentration of molecular oxygen present in an atmosphere or liquid, comprising exposing the atmosphere or liquid to a composition according to any one of claims 1-27 and thereafter, reducing the reducible organic compound.

29. A method for reducing the concentration of molecular oxygen in an atmosphere or liquid, comprising exposing the atmosphere or liquid to a pre-reduced form of a composition according to any one of claims 1-27.

30. A polymeric film comprising at least one layer comprising a composition according to any one of claims 1-27.

31. A multilayer polymeric film comprising at least one layer comprising a composition according to any one of claims 1-17, 25 and 26, and at least one other layer comprising a scavenging component reactive towards an activated oxygen species.

32. A packaging material comprising a composition according to any one of claims 1-27 or a film according to claim 30 or 31.

33. An indicator of breakage of a package seal, comprising a composition according to any one of claims 1-27, wherein the reducible organic compound undergoes a detectable change in colour, fluorescence emission or UV-visible, infrared, near-infrared absorption spectrum as its capacity for oxygen scavenging becomes exhausted due to breakage of the seal.

34. An indicator according to claim 33, wherein the reducible organic compound undergoes a detectable change in fluorescence emission.